Name: .... Index No. ....

School: ....Date: .... Candidate's Sign ....

233/2
CHEMISTRY
PAPER 2 (THEORY)
FORM 4
MARCH / APRIL 2013
TIME: 2HOURS

ELDORET EAST INTER – SCHOOLS EXAMINATIONS – 2013

The Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES
- Write your name, Index No. and class in the spaces provided above.
- Answer all questions in the spaces provided
- Mathematical tables and electronic calculators may be used.
- All working and diagrams must be clearly shown where necessary.
- Candidates should check the question paper to ascertain that all the pages are printed and that no questions are missing.

FOR EXAMINER'S USE ONLY

Questions	Maximum Score	Candidates' Score
1	13	
2	13	
3	10	
4	13	
5	15	
6	8	
7	8	
Total Score	**80**	

1. a) Draw the structural formula for all the isomers of $C_2H_2Cl_2$. (2marks)

b) Describe a chemical test that can be used to distinguish between propane and propene.
(2marks)

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c) The following scheme represents various reactions starting with ethene. Use it to answer the questions that follow.
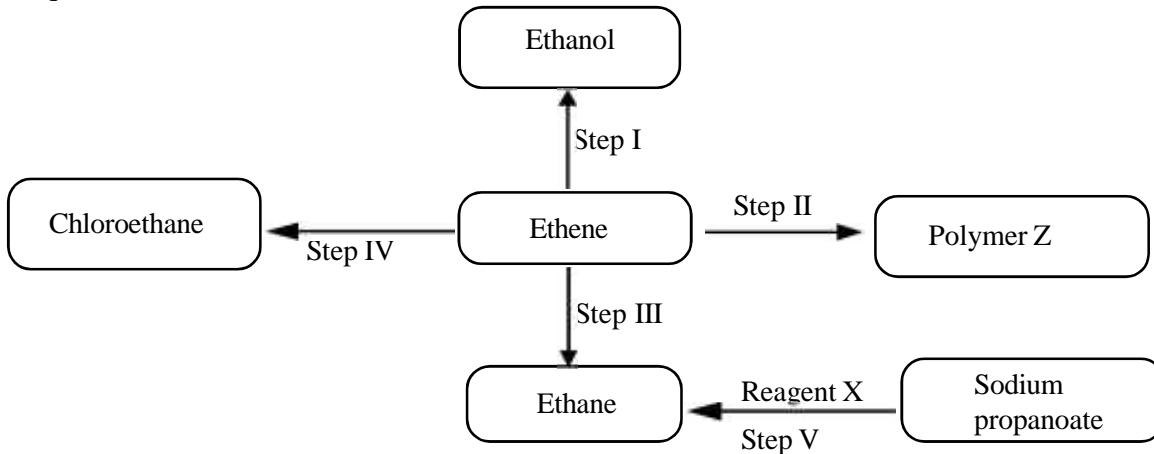
i) State the reagents(s) and conditions necessary for step 1 to take place (2marks)

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ii) Give the general formula and name of the polymer Z. (1mark)

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iii) Name the reagent used in step IV. (1mark)

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iv) Give the name of the type of reaction that take place in step III, and state one industrial application of it. (1mark)

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v) Name reagent X and state the condition necessary for reaction in step V to take place
Reagent X (½ mark)

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Condition (½ mark)

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vi) Write the equation for the reaction that takes place in step V. (1mark)

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vii) Calculate the mass of sodium propanoate in grams required to react completely and produce $6dm^3$ of ethane gas at room temperature and pressure.
(Na = 23, C = 12, O = 16, H = 1; molar gas volume = $24dm^3$) (2marks)

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2. The grid below is part of the periodic table. Use it to answer the questions that follow. (The letters are not the actual symbol of the elements)

P				S	T	U	V	W	X
Q						M			Y
R									Z

a) Which is the most reactive metallic element shown in the table? Explain. (2marks)

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b) i) Write the formula of the compound formed when element T reacts with element V. (1mark)

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ii) Name the type of bond in the compound formed between element T and W. (1mark)

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c) i) What is the name given to the group of elements where P, Q and R belong? (1mark)

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ii) Write an equation for the reaction that occurs when element R in solid form react with an aqueous solution containing ions of element P. (1mark)

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d) N is an element that belongs to the 4th period of the periodic table and is a member of the halogen family of elements. Show the position of J in the grid. (1mark)

e) M forms two oxides. Write the formula of each of the two oxides. (1mark)

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f) State and explain one use of element Y. (1mark)

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g)   i) Draw and label the atomic structure of atoms of element T. (2marks)

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    ii) Using dots $(\cdot)$ and crosses (X) to represent electrons show the bonding in the compound formed between M and W. (2marks)

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3.   a)   Study the set-up below and answer the questions that follow.

dil $H_2SO_{4(aq)}$
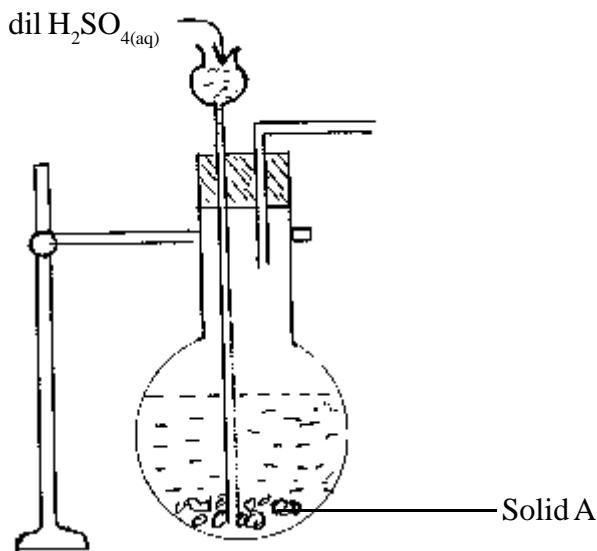
Solid A

i) Complete the diagram to show how a dry sample of hydrogen gas can be collected.

(3marks)

ii) Name solid A. (1mark)

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iii) Write an equation for each of the following.

    I)   Hydrogen gas reacting with hot solid copper (II) oxide. (1mark)

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    II)   Hydrogen gas reacting with fluorine gas (1mark)

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b) Dry hydrogen gas was passed over a heated oxide of lead of mass 2.39g until there was no further change. The mass of the residue was found to be 2.07g. Determine the formula of the oxide it its molecular mass is 478g. (3marks)

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c) State and explain one use of hydrogen gas. (1mark)

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4. a) An experiment was set up to investigate the effect of temperature on the rate of reaction between 1.0g calcium carbonate and excess hydrochloric acid. The temperature was varied from 15^0C, 20^0C and 25^0C; and data obtained for the 3 sets of reagents.

i) Sketch a graph of volume of carbon (IV) oxide gas produced against time for each temperature on the axes below. Label each graph with corresponding temperature. Consider all gas volumes measured at same temperature and pressure.


(4marks)

ii) Explain the shape of graphs you've drawn in (a) above. (2marks)

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b) In an experiment, equal amounts of magnesium powder were placed into test tube 1 and 2 as shown below.

| Test tube 1 | Test tube 2 |
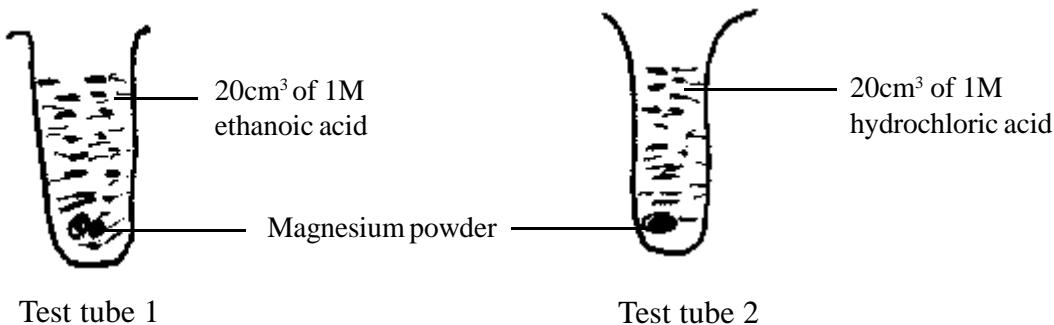
i) Explain why the magnesium powder in test tube 2 gets used up faster than that in test tube 1.
(3marks)

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ii) Other than concentration, state one factor that affects the rate of a reaction. (1mark)

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c) Consider the equilibrium of the reaction below:

$$A_{(g)} + B_{(g)} \rightleftharpoons D_{(l)} + E_{(g)}; \Delta H^\theta = \text{-ve.}$$

In which direction will the equilibrium position shift as a result of each of the following changes?
Explain.

i) Raising the temperature (1½ marks)

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ii) Reducing the volume of the container. (1½ marks)

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5. a) What is meant by molar heat of neutralization. (1mark)

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b) A series of experiments were carried out to investigate the changes in temperature that occur when different volumes of 2M sodium hydroxide were added to various volumes of 1M solution of unknown acid A. The apparatus used are shown in the diagram below.

Graduated cylinder

Thermometer

Small plastic beaker (100ml)

Lab Bench

The results obtained were recorded as in the table below.

Experiment	1	2	3	4	5	6	7
Volume of acid A in the beaker in (cm3)	10	15	20	25	30	35	40
Volume of 2M sodium hydroxide added in cm3	40	35	30	25	20	15	10
Initial temperature 0C	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Final temperature 0C	29.0	33.0	37.0	37.5	36.0	33.5	31.0
Temperature change							

i) Complete the table above (1mark)

ii) Plot a graph of final temperature (y-axis) against volume of sodium hydroxide. (3marks)
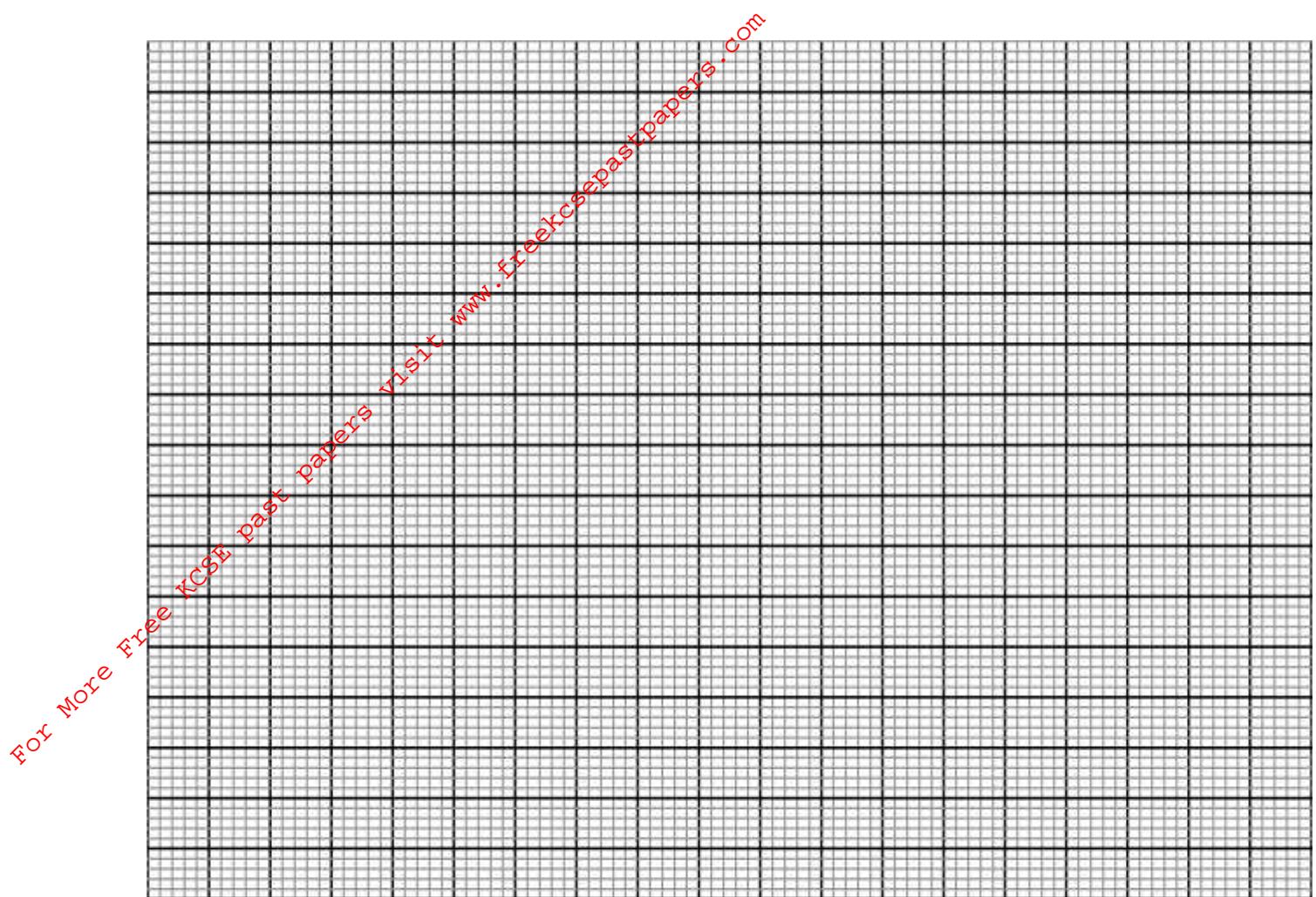
iii)   From the graph determine the highest temperature change   (1mark)

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iv)   From the graph determine the volume of acid A and sodium hydroxide solution required for completer neutralization.

Volume of sodium hydroxide   (1mark)

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Volume of acid solution A   (½ mark)

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v)   Calculate the
I)   Moles of sodium hydroxide required to neutralize acid A completely (from (iv) above)
                                                                        (1mark)

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II)   Heat change for reaction in (iv) above
$\Delta H = mc\Delta T$ (Take C = 4.2Jg^{-1} ^{0}C^{-1})   (1½ marks)

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III)   Molar heat change for neutralization of sodium hydroxide.   (2marks)

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vi)   Why is it advisable to use a plastic beaker which is small?   (1mark)

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vii)   The molar enthalpies of neutralization for dilute hydrochloric acid and dilute nitric (v)
acid are -57.2KJ/mole while that of ethanoic acid is -55.2KJ/mol. Explain this
observation.   (2marks)

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6.   A student was provided with a solid salt mixture labeled M. He carries out tests on M
according to the scheme below. Study it and answer the questions that follow:-

a) i) Name process R (1mark)
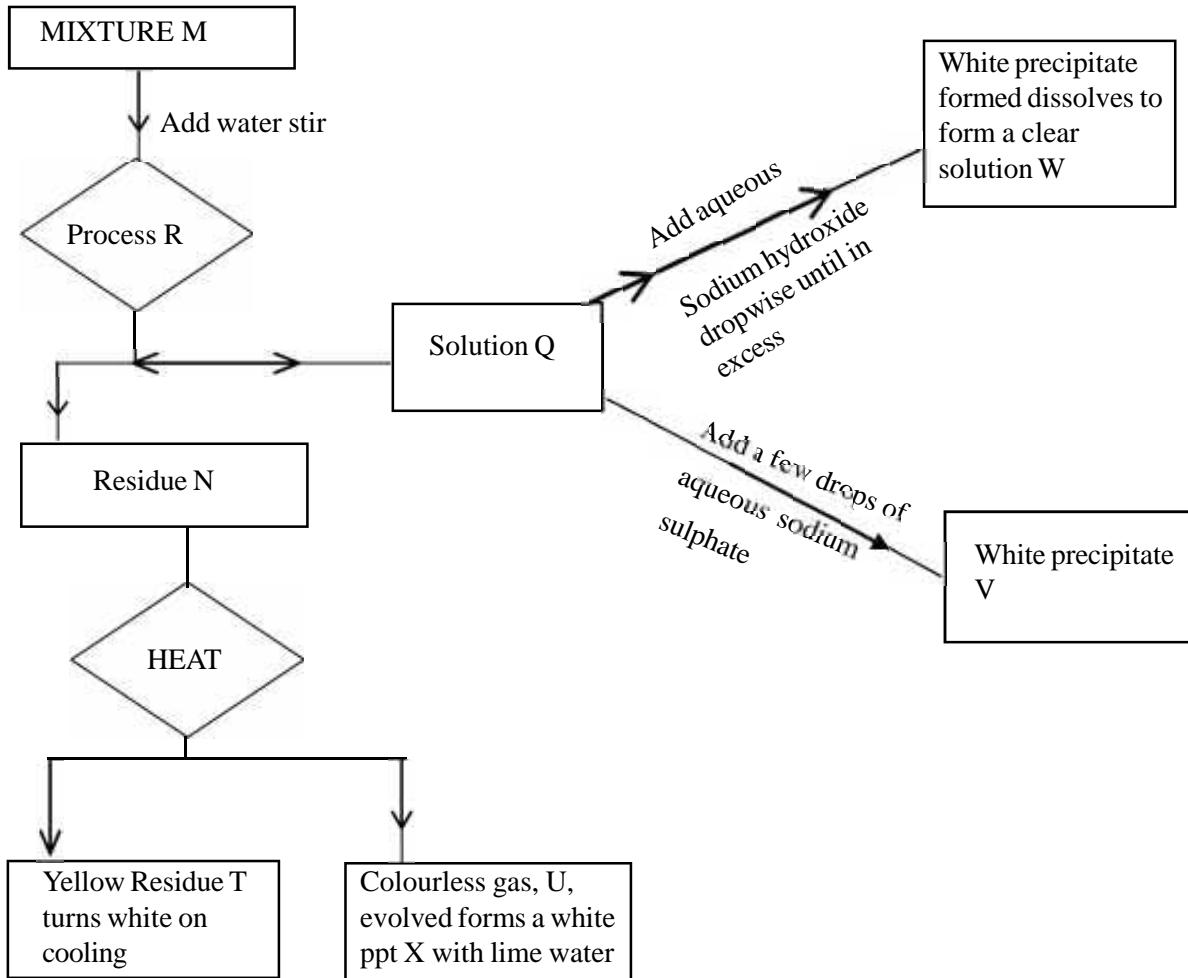
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ii) Identify the cation present in

I) Filtrate Q (1mark)

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II) Residue N (1mark)

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iii) Identify the anion present in residue N (1mark)

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b) Write an equation for the reaction taking place during decomposition of residue N. (1mark)

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c) Write ionic equations for the reaction that produces substances V and W. (2marks)

V

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W

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d) If gas U is bubbled through lime water for a long time, the precipitate X dissolves to form a colourless solution. Explain this observation. (1mark)

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7. The following diagram shows a set up used to prepare sulphur (IV) oxide in the laboratory. Use it to answer the questions that follow.

Sulphur(iv) oxide →
Gas A →
Solid B
Fused calcium chloride
To furme cupboard

Concentrated sulphuric (VI) acid

Ice + salt mixture

Solid sulphur (vi) oxide
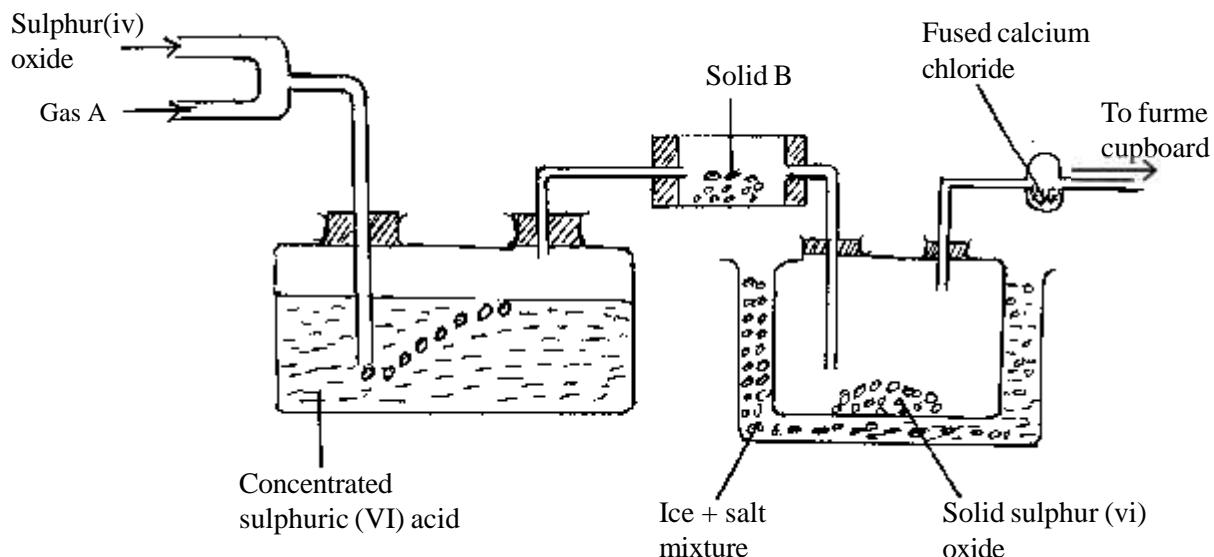
a) Name substance A and B   (1mark)

A:

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B:

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b) What is the role of substance?

     i) Solid B   (1mark)

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     ii) Fused calcium chloride.   (1mark)

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     iii)   Salt in the ice/salt mixture.   (1mark)

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c) Explain why a fume chamber is used   (1mark)

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d) Write an equation for the reaction that took place in the combustion tube.   (1mark)

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e) State one possible source of sulphur (IV) oxide gas used in this experiment.   (1mark)

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f) What property of concentrated sulphuric (VI) acid is shown in this reaction?   (1mark)

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